

REMARKS/ARGUMENTS

Favorable reconsideration of this application as presently amended and in light of the following discussion is respectfully requested.

Claims 1, 5, 7-29, 31-34, and 36-41 are pending in the present application. Claims 1, 5, 7, 8, 14, 15, 23, 31, and 36 are amended, Claims 2-4, 6, 30, and 35 are canceled without prejudice, and new Claims 37-41 are added by the present amendment.

In the outstanding Office Action, Claims 3-5 were rejected under 35 U.S.C. § 112, second paragraph; Claims 1, 2, 6, 7, 9-11, 14, 23-26, 30, and 31 were rejected under 35 U.S.C. § 102(a) as anticipated by Hidaka (U.S. Patent Application Publication No. 2003/0031046 A1); Claims 3 and 4 were rejected under 35 U.S.C. § 103(a) as unpatentable over Hidaka in view of Shi et al. (U.S. Patent No. 6,680,863 B1, herein “Shi”); and Claims 8, 12, 13, 15-22, 27-29, and 32-36 were indicated as allowable if rewritten in independent form.

Applicant notes an Information Disclosure Statement (IDS) was filed on March 4, 2004, which at this time has not been indicated as considered. Applicant respectfully requests the Examiner to initialize the PTO-1449 form listing the references filed in the IDS as acknowledged. A copy of the filed Information Disclosure Statement, the PTO-1449 form, and the date-stamped Filing Receipt are provided herewith for the Examiner’s convenience.

Applicant thanks the Examiner for the indication of allowable subject matter. In view of this indication, independent Claim 31 is amended to include the allowable features of Claim 35 and thus, Claim 35 is canceled. Regarding the remaining allowable dependent claims, those claims are maintained in dependent form because it is believed the amended independent claims patentably distinguish over the applied art.

The specification has been amended to be consistent with amended Claims 1 and 31. No new matter has been added.

Regarding the rejection of Claims 3-5 under 35 U.S.C. § 112, second paragraph, Claims 3-4 have been canceled and Claim 5 has been amended to depend from Claim 1. No new matter has been added. Accordingly, it is respectfully requested this rejection be withdrawn.

Regarding the rejection of Claims 1, 2, 6, 7, 9-11, 14, 23-26, 30, and 31, independent Claims 1, 7, and 14 have been amended to more clearly recite novel features and independent Claim 30 has been canceled. The claim amendments find support in Claims 4 and 15 and in Figures 1 and 15 and their corresponding description in the specification. No new matter has been added.

Briefly recapitulating, independent Claim 1 is directed to a semiconductor memory device that includes, *inter alia*, a plurality of word lines, a plurality of bit lines, a first memory cell, a second memory cell, a memory cell array, a row decoder, and a row driver. The memory cell array includes the first and second memory cells, which are disposed at intersections of a word line and bit lines. The row driver includes a first current source that supplies a first write current to the word line selected by the row decoder and a second current source that supplies a second write current to the word line selected by the row decoder. An absolute value of the second write current is smaller than that of the first write current.

In a non-limiting example, Figure 1 shows the plurality of word lines WWL1 to WWL_m, the plurality of bit lines BL1 to BL_n, the row decoder 100, the row driver 110, the first current source 111-1 to 111-_m, and the second current source 112-1 to 112-_m. In another non-limiting example, Figures 5A and 5B show that the absolute value of the second write current is smaller than that of the first write current.

Turning to the applied art, Hidaka shows in Figures 1 and 2 a memory cell array 10 having a row driver 30 connected to a plurality of word lines RWL1 to RWL_m. The memory

cell array 10 includes memory cells MC disposed at the intersections of word lines and bit lines. However, Hidaka does not teach or suggest that (i) the row driver 30 includes a first current source and a second current source, (ii) the first current source supplies a first write current to the word line selected by the row decoder and the second current source supplies a second write current to the word line selected by the row decoder, and (iii) an absolute value of the second write current is smaller than that of the first write current.

Accordingly, it is respectfully submitted that independent Claim 1 and each of the claims depending therefrom patentably distinguish over Hidaka.

Because Claim 1 has been amended to incorporate the features of Claim 4, and Claim 4 has been rejected over the combination of Hidaka and Shi, this combination is discussed next.

Shi is directed to a memory array having a plurality of current sources 134, 136, 166, and 168 as shown in Figure 4. However, Shi does not teach or disclose that first and second current sources are used to write data in the first and second memory cells, respectively. Further, amended Claim 1 recites that the first current source supplies the first write current to the word line such that a magneto-resistive element of the first memory cell has either the first or second resistance to perform a write operation, and the second current source supplies the second write current to the word line such that the magneto-resistive element of the second memory cell has a resistance between the first and second resistances. These features are not taught or suggested by Shi. In addition, Shi does not teach or suggest that a second write current is smaller than the first write current. Thus, Shi does not cure the deficiencies of Hidaka discussed above.

Therefore, it is respectfully submitted that independent Claim 1 and each of the claims depending therefrom patentably distinguish over Hidaka and Shi, either alone or in combination.

Independent Claim 7 has been amended to recite a row driver that supplies a first write current, a column driver that includes (1) a first current source that supplies a second write current, and (ii) a second current source that supplies a third write current. The claim amendments find support in Figure 15 and in its corresponding description in the specification. For example, Figure 15 shows the second write current being supplied to bit lines BL1 to BL(I-1) and BL(I+1) to BLn from first current sources 83-1 to 83-n, and the third write current being supplied to the bit line BLI from the second current source 84.

Further, Claim 7 has been amended to add the feature of original Claim 1 that “a column driver” includes “first and second current sources” which supply “second and third write currents,” respectively. The first and second current sources in amended Claim 7 correspond to, for example, the first current source 83-1 to 83-n and the second current source 84, respectively, as shown in Figure 15. No new matter has been added.

Furthermore, Claim 7 has been amended to recite “an absolute value of the third write current being smaller than that of the second write current,” similar to Claim 1. For the reasons discussed above regarding independent Claim 1, and because Shi does not teach or suggest “an absolute value of the third write current being smaller than that of the second write current,” Applicant respectfully submits that independent Claim 7 and each of the claims depending therefrom patentably distinguish over Hidaka or Shi, either alone or in combination.

Independent Claim 14 has been amended to recite “the driver circuit including a first current source and a second current source, the first current source supplying the write current, the second current source supplying the write current and having a greater current drive ability than the first current source.” The claim amendments find support in original Claim 15. Because independent Claim 14 has been amended to include the allowable features of Claim 15, Applicant believes that Claim 14 is also in condition for allowance.

Regarding the rejection of Claims 3 and 4 under 35 U.S.C. § 103(a) as unpatentable over Hidaka in view of Shi, that rejection is moot because Claims 3 and 4 have been canceled.

New Claims 37-41 has been added to set forth the invention in a varying scope. In particular, new Claims 37-41 correspond to Claim 9-13 but depend from Claim 7 instead of Claim 1. No new matter has been added. Thus, it is respectfully submitted new Claims 37-41 are allowable for similar reasons as discussed above.

Consequently, in light of the above discussion and in view of the present amendment, the present application is believed to be in condition for allowance and an early and favorable action to that effect is respectfully requested.

Respectfully submitted,

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